

REMARKS

The Applicants appreciate the thoroughness with which the subject application has been examined. By this amendment, changes have been made to certain claims to overcome the Examiner's rejections and more concisely claim and describe the present invention. Claims 1, 5-18, and 20-31 remain in the application for reconsideration by the Examiner. The Examiner's allowance of all pending claims is earnestly solicited.

Within the first claim set, independent claim 1 and dependent claims 2-5, 8, 9, 13 and 27-31 stand rejected under Section 102(e) as anticipated by Katata (6,500,686). Claims 6, 7, 10-12 and 14 stand rejected under Section 103(a) as unpatentable over Katata in view of the Applicant's admitted prior art.

To further distinguish the invention over the cited art, the Applicants have amended the second and fourth paragraphs of independent claim 1 to "supporting the wafer in a spaced-apart relation from a chuck" and "depositing material from the target onto the wafer during which the wafer temperature is controlled by the chuck temperature." As amended the third paragraph refers to "radiant heat flow from the chuck to the wafer." The last paragraph claims, "depositing material from the target onto the wafer during which the wafer temperature is controlled by the chuck temperature to achieve a desired grain orientation of deposited material." Support for the claim 1 amendments can be found in the specification in Figure 6 and the accompanying text in paragraph [0027].

Katata discloses a chuck electrode divided into at least two portions (an inner and an outer circumferential electrode portion) with the chuck voltage applied successively from the inner electrode portion to the outer electrode portion. This technique avoids the prior art problem as Katata explains, "[w]hen the wafer is 103 of room temperature is disposed and chucked on the hot plate having a high temperature, the wafer 103 is thermally expanded in accordance with the temperature elevation. However, since the wafer 103 is fixed to the entire surface of the plate body 100 by the electrostatic chucking force, the wafer 103 fails to be expanded sufficiently . . . with the result that the wafer 103 is finally cracked by the compression stress."

Katata does not disclose or mention grain orientation of the deposited material as the Applicants have set forth in amended claim 1. In his rejection of claim 13 (depending from claim 12 and claiming “the deposited material exhibits a desired grain orientation”) the Examiner suggests that Katata inherently teaches that the deposited material (e.g., silicon oxide) exhibits a desired grain orientation, since silicon oxide grains has a certain grain orientation. In fact, as used in semiconductor technology, silicon oxide is an amorphous material that does not exhibit a granular structure.

Katata also does not disclose the wafer in a spaced-apart relation to the chuck as Katata’s electrostatic chucking mechanism draws the wafer against the upper surface of the chuck, establishing a conductive heat path between the wafer and the chuck. See for example, Katata’s Figure 1A. As set forth in amended claim 1, the Applicant’s wafer is spaced-apart from the chuck and radiant heat flow from the chuck to the wafer controls the wafer temperature.

Further, during the Applicant’s step of depositing material from the target onto the wafer “the wafer temperature is controlled by the chuck temperature.” Katata discusses the wafer heating and electrostatic chucking effects only when the wafer enters the chamber. Katata does not discuss the heating/cooling effects that occur in the chamber during the deposition process as the Applicants discuss at paragraph [0015]. Since Katata fails to recognize this problem addressed by the Applicants his disclosure cannot suggest the Applicant’s solution. In particular, as set forth in the fourth paragraph of claim 1 the Applicants claim “depositing material from the target onto the wafer during which the wafer temperature is controlled by the chuck temperature.”

Further, according to the prior art deposition processes, wafer temperature is determined substantially by heat produced within the chamber during the deposition process and by the frictional forces generated by the particles impinging the wafer. See the Applicant’s background paragraph [0015]. In contrast, the Applicant’s invention as set forth in amended claim 1 includes the step of “depositing material from the target onto the wafer during which the wafer temperature is controlled by the chuck temperature.”

Each of the dependent claims 5-14 claim elements of the present invention that further distinguish the invention over the art of record and therefore are deemed to be in condition for allowance.

In particular, according to claim 5, the method of the present invention positions the “wafer at a distance from the target such that the wafer temperature exhibits a greater dependence on a chuck temperature than on other heat producing effects during the step of depositing material.

Claims 2-4 have been cancelled, without prejudice. The Applicants reserve the right to prosecute these or similar claims in a continuing application. The cancellation of claims 2-4 is not to be construed as an admission as to the validity of the rejection or the relevance of the cited art.

The second set of claims, i.e., independent claim 15 and dependent claims 16-18 and 20-26 are rejected under Katata in view of the Applicant’s admitted prior art.

To further distinguish the invention over the cited art, the Applicants have amended the second and fourth paragraphs of independent claim 15 to “a chuck for supporting the wafer while depositing material on the wafer, wherein the wafer is urged against an upper surface of the chuck solely by gravitational forces exerted by the wafer against the chuck” and “a controller for controlling the chuck heater, wherein the wafer is spaced apart from the target such that during deposition of the target material on the wafer, the wafer temperature is maintained within the temperature range in response to heat flow from the chuck to the wafer.” Support for the claim 15 amendments can be found in the specification in Figure 6 and the accompanying text in paragraph [0027].

As discussed above, Katata discloses a chuck electrode divided into at least two portions to avoid wafer breakage due to expansion forces generated when the wafer is chucked onto the hot plate.

Katata discloses an electrostatic chuck and therefore does not disclose the wafer is “urged against an upper surface of the chuck solely by gravitational forces exerted by the wafer against the chuck”

Further, the Applicant’s claim a controller that controls the chuck heater “wherein the wafer is spaced apart from the target such that during deposition of the target material on the

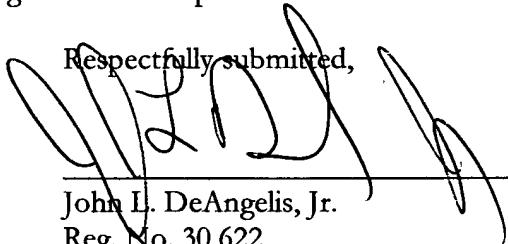
wafer, the wafer temperature is maintained within the temperature range in response to heat flow from the chuck to the wafer." Katata does not disclose this element of the Applicant's invention.

Each of the dependent claims 16-18 and 20-26 claim elements of the present invention that further distinguish the invention over the art of record and therefore are deemed to be in condition for allowance. The Examiner's allowance of these pending claims is earnestly solicited.

The Applicants have attempted to comply with all of the points raised in the Office Action and it is believed that the remaining claims in the application, i.e., claims 1, 5-18, and 20-31, are now in condition for allowance. In view of the foregoing amendments and discussion, it is requested that the Examiner's claim rejections have been overcome. It is respectfully requested that the Examiner reconsider these rejections and issue a Notice of Allowance for all the claims pending in the application.

If a telephone conference will assist in clarifying or expediting this Amendment, the Examiner is invited to contact the undersigned at the telephone number below.

Respectfully submitted,



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CERTIFICATE OF MAILING

I HEREBY CERTIFY that this Amendment is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 1st day of December 2005.



John L. DeAngelis